DOCUMENT RESUME

ED 066 462 TM 001 946

TITLE	Cutting-and-Creasing Pressman (paper goods) 649.782--Technical Report on Development of USTES Aptitude Test Battery.
INSTITUTION	Manpower Administration (DOL), Washington, D.C. U.S. Training and Employment Service.
REPORT NO	TR-S-300R
PUB DATE	Jun 70
NOTE	17p.
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	*Aptitude Tests; *Cutting Scores; Evaluation Criteria; Job Applicants; *Job Skills; Norms; Occupational Guidance; *Paper (Material); *Personnel Evaluation; Test Reliability; Test Validity
IDENTIFIERS	Cutting and Creasing Pressman; GATB; *General Aptitude Test Battery; *Pressman (Paper Goods)

ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample and a personnel evaluation form are also included. (AG)

ED 066462

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S-300R

June 1970

U.S. Training and
Employment Service
Technical Report
S-300R

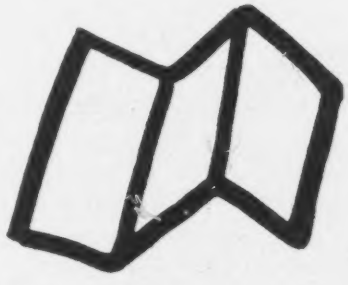
Development of USTES

APTITUDE TEST
BATTERY FOR

CUTTING-AND-CREASING PRESSMAN

(paper goods)
649.782

U.S. DEPARTMENT OF LABOR
Manpower Administration



TM 001 946

Technical Report on Development of USTES Aptitude Test Battery

For . . . . . .

Cutting-and-Creasing Pressman (paper goods) 649.782

S-300R

(Developed in Cooperation with the
Indiana, Michigan, Minnesota, Texas
and Wisconsin State Employment Service)

U.S. Department of Labor
Manpower Administration

June 1970

FOREWARD

The United States Training and Employment Service General Aptitude Test Battery (GATB) was first published in 1947. Since that time the GATB has been included in a continuing program of research to validate the tests against success in many different occupations. Because of its extensive research base the GATB has come to be recognized as the best validated multiple aptitude test battery in existence for use in vocational guidance.

The GATB consits of 12 tests which measure 9 aptitudes: General Learning Ability, Verbal Aptitude, Numerical Aptitude, Spatial Aptitude, Form Perception, Clerical Perception, Motor Coordination, Finger Dexterity, and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, with a standard deviation of 20.

Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, in combination predict job performance. For any given occupation, cutting scores are set only for those aptitudes which contribute to the prediction of performance of the job duties of the experimental sample. It is important to recognize that another job might have the same job title but the job content might not be similar. The GATB norms described in this report are appropriate for use only for jobs with content similar to that shown in the job description included in this report.

GATB Study #2498

Development of USTES Aptitude Test Battery

For

Cutting-and-Creasing Pressman (paper goods) 649.782-010

S-300R

This report describes research undertaken for the purpose of developing General Aptitude Test Battey (GATB) norms for the occupation of Cutting-and-Creasing Pressman (paper goods) 649.782-010. The following norms were established:

GATB Aptitudes	Minimum Acceptable GATB Scores
N-Numerical Aptitude	70
S-Spatial Aptitude	90
P-Form Perception	70

Research Summary

Sample:

77 male workers employed as Cutting-and-Creasing Pressman at various Folding Paper Box firms in Indiana, Michigan, Minnesota, Texas and Wisconsin.

This study was conducted prior to the requirement of providing minority group information. Therefore, minority group status is unknown.

Criterion:

Supervisory ratings.

Design:

Concurrent (test and criterion data were collected at approximately the same time).

Minimum aptitude requirements were determined on the basis of a job analysis and statistical analyses of aptitude mean scores, aptitude-criterion correlations and selective efficiencies.

Concurrent Validity:

Phi Coefficient = .32 ($P/2 < .005$)

Effectiveness of Norms:

Only 66% of the nontest-selected workers used for this study were good workers; if the workers had been test-selected with the above norms, 79% would have been good workers. Thirty-four percent of the non-test-selected workers used for this study were poor workers; if the workers had been test-selected with the above norms, only 21% would have been poor workers. The effectiveness of the norms is shown graphically in Table 1:

TABLE 1

Effectiveness of Norms

	Without Tests	With Tests
Good Workers	66%	79%
Poor Workers	34%	21%

Sample Description

Size:

N = 77

Occupational Status:

Employed Workers

Work Setting:

Workers were employed by the following firms in Indiana, Michigan, Minnesota, Texas, and Wisconsin:

State	Company
Indiana	Crown Paper Box, Indianapolis
Indiana	Indianapolis Paper Container, Indianapolis

State	Company
Indiana	Paper Container, Indianapolis
Indiana	Paper Package, Indianapolis
Michigan	Consolidated Paper, Monroe
Minnesota	Waldorf Paper, Co., St. Paul
Texas	Houston Paper Co., Houston
Wisconsin	Cornell Paper Co., Milwaukee
Wisconsin	Paper Products Co., Milwaukee
Wisconsin	A. Geo. Schulz Co., Milwaukee
Wisconsin	Green Bay Packaging Co., Green Bay
Wisconsin	Forsberg Paper Box Co., Madison
Wisconsin	Milprint, Inc., Milwaukee
Wisconsin	Marathon Corp., Menasha
Wisconsin	Marathon Corp., Wausau

Employer Selection Requirements:

Education: None required.

Previous Experience: None required.

Tests: None used.

Principal Activities

The job duties for each worker are comparable to those shown in the job description in the Appendix.

Minimum Experience:

All workers in the final sample had at least twelve months job experience.

TABLE 2

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education and Experience.

	Mean	SD	Range	r
Age (years)	39.2	9.3	20-64	-.232
Education (years)	10.1	1.7	6-13	.346**
Experience (months)	146.5	85.8	12-480	.067

**Significant at the .01 level.

Experimental Test Battery

All 12 tests of the GATB, B-1002B, were administered during the period July 1962 to October 1963.

Criterion

The criterion data consisted of supervisory ratings of job proficiency made at approximately the same time as the tests were administered with a time interval of two weeks between the two ratings. The immediate supervisor rated each worker.

Rating Scale:

Form SP-21 "Descriptive Rating Scale" was used. The scale (see Appendix) consists of nine items covering different aspects of job performance. Each item has five alternative responses corresponding to different degrees of job proficiency.

Reliability:

A reliability coefficient of .93 was obtained between the initial ratings and the re-ratings, indicating a significant relationship. The final criterion score consists of the combined scores of the two ratings.

Criterion Score Distribution:

Possible Range:	18-90
Actual Range	38-90
Mean:	66.5
Standard Deviation:	13.6

Criterion Dichotomy:

The criterion distribution was dichotomized into low and high groups by placing 34% of the sample in the low group to correspond with the percentage of workers considered unsatisfactory or marginal. Workers in the high criterion group were designated as "good workers" and those in the low group as "poor workers." The criterion critical score is 61.

Aptitudes Considered for Inclusion in the Norms

Aptitudes were selected for tryout in the norms on the basis of a qualitative analysis of job duties involved and a statistical analysis of test and criterion data. Tables 3, 4 and 5 show the results of the qualitative and statistical analyses.

Qualitative Analysis
(Based on the job analysis, the aptitudes indicated appear to be important to the work performance)

Aptitudes	Rationale
G - General Learning Ability	Required to learn correct procedures to plan and set up automatic cutting and creasing cylinder press and to make necessary adjustments according to production run; to learn techniques of positioning and attaching paper pattern to cylinder; and to learn related production operations in the carton department.
P - Form Perception	Required to inspect litho sheets for proper scoring and cutting after each load and to detect defects in cuting and creasing of completed stacks.
M - Manual Dexterity	Required to move levers in setting up and adjusting the press; to tend machine during operation and to use hand tools to make minor repairs on machine.

On the basis of the job analysis data, V-Verbal Aptitude was rated "irrelevant" for success in this occupation.

TABLE 4

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB; N=77

	Mean	SD	Range	r
G - General Learning Ability	94.5	17.4	59-155	.335**
V - Verbal Aptitude	95.3	15.1	65-140	.269*
N - Numerical Aptitude	90.9	19.2	49-147	.318**
S - Spatial Aptitude	100.3	17.2	67-153	.285*
P - Form Perception	90.7	17.7	47-133	.355**
Q - Clerical Perception	94.2	14.9	67-153	.240*
K - Motor Coordination	94.3	18.9	47-134	.271*
F - Finger Dexterity	90.8	17.3	46-132	.199
M - Manual Dexterity	86.8	21.8	27-135	.230*

*Significant at the .05 level.
**Significant at the .01 level.

TABLE 5

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data									
Important	X				X				X
Irrelevant		X							
Relatively High Mean	X	X		X			X		
Relatively Low Standard Dev.						X			
Significant Correlation with Criterion	X	X	X	X	X	X	X		X
Aptitudes to be Considered for Trial Norms	G		N	S	P	Q	K		M

Derivation and Validity of Norms

Final norms were derived on the basis of the degree to which trial norms consisting of various combinations of aptitudes G, N, S, P, Q, K, and M at trial cutting scores were able to differentiate between the 66% of the sample considered to be good workers and the 34% of the sample considered to be poor workers. Trial cutting scores at five-point intervals approximately one standard deviation below the mean are tried because this will eliminate about one-third of the sample with three-aptitude norms. For four aptitude trial norms, cutting scores of slightly less than one standard deviation below the mean will eliminate about one-third of the sample; for two-aptitude trial norms, minimum cutting scores of slightly more than one standard deviation below the mean will eliminate about one-third of the sample. The Phi Coefficient was used as a basis for comparing trial norms. Forms of N-70, S-90, and P-70 provided optimum differentiation for the occupation of Cutting-and-Creasing Pressman (paper goods) 649.782-010. The validity of these norms is shown in Table 6 and is indicated by a Phi Coefficient of .32 (statistically significant at the .005 level).

TABLE 6

Concurrent Validity of Test Norms
N-70, S-90 and P-70

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	13	38	51
Poor Workers	16	10	26
Total	29	48	77

Phi Coefficient = .32 Chi Square (X^2_{xy}) = 8.1

Significance Level = $P/2 < .005$

Determination of Occupational Aptitude Pattern

The data for this study met the requirements for incorporating the occupation studied into OAP-38 which is shown in the 1970 edition of Section II of the Manual for the General Aptitude Test Battery. A Phi Coefficient of .15 is obtained with the OAP-38 norms of N-80, S-85, K-80

SP-21
Rev. 2/61

DESCRIPTIVE RATING SCALE
(For Aptitude Test Development Studies)

Score_____

RATING SCALE FOR _____
D. O. T. Title and Code

Directions: Please read Form SP-20, "Suggestions to Raters", and then fill in the items listed below. In making your ratings, only one box should be checked for each question.

Name of Worker (print) _____
(Last) (First)

Sex: Male____ Female____

Company Job Title: _____

How often do you see this worker in a work situation?

☐ See him at work all the time.

☐ See him at work several times a day.

☐ See him at work several times a week.

☐ Seldom see him in work situation.

How long have you worked with him?

☐ Under one month.

☐ One to two months.

☐ Three to five months.

☐ Six months or more.

A. How much work can he get done? (Worker's ability to make efficient use of his time and to work at high speed.)

☐ 1. Capable of very low work output. Can perform only at an unsatisfactory pace.

☐ 2. Capable of low work output. Can perform at a slow pace.

☐ 3. Capable of fair work output. Can perform at an acceptable but not a fast pace.

☐ 4. Capable of high work output. Can perform at a fast pace.

☐ 5. Capable of very high work output. Can perform at an unusually fast pace.

B. How good is the quality of his work? (Worker's ability to do high-grade work which meets quality standards.)

☐ 1. Performance is inferior and almost never meets minimum quality standards.

☐ 2. The grade of his work could stand improvement. Performance is usually acceptable but somewhat inferior in quality.

☐ 3. Performance is acceptable but usually not superior in quality.

☐ 4. Performance is usually superior in quality.

☐ 5. Performance is almost always of the highest quality.

C. How accurate is he in his work? (Worker's ability to avoid making mistakes.)

☐ 1. Makes very many mistakes. Work needs constant checking.

☐ 2. Makes frequent mistakes. Work needs more checking than is desirable.

☐ 3. Makes mistakes occasionally. Work needs only normal checking.

☐ 4. Makes few mistakes. Work seldom needs checking.

☐ 5. Rarely makes a mistake. Work almost never needs checking.

D. How much does he know about his job? (Worker's understanding of the principles, equipment, materials and methods that have to do directly or indirectly with his work.)

☐ 1. Has very limited knowledge. Does not know enough to do his job adequately.

☐ 2. Has little knowledge. Knows enough to "get by."

☐ 3. Has moderate amount of knowledge. Knows enough to do fair work.

☐ 4. Has broad knowledge. Knows enough to do good work.

☐ 5. Has complete knowledge. Knows his job thoroughly.

E. How much aptitude or facility does he have for this kind of work? (Worker's adeptness or knack for performing his job easily and well.)

☐ 1. Has great difficulty doing his job. Not at all suited to this kind of work.

☐ 2. Usually has some difficulty doing his job. Not too well suited to this kind of work.

☐ 3. Does his job without too much difficulty. Fairly well suited to this kind of work.

☐ 4. Usually does his job without difficulty. Well suited to this kind of work.

☐ 5. Does his job with great ease. Exceptionally well suited for this kind of work.

F. How large a variety of job duties can he perform efficiently? (Worker's ability to handle several different operations in his work.)

☐ 1. Cannot perform different operations adequately.

☐ 2. Can perform a limited number of different operations efficiently.

☐ 3. Can perform several different operations with reasonable efficiency.

☐ 4. Can perform many different operations efficiently.

☐ 5. Can perform an unusually large variety of different operations efficiently.

G. How resourceful is he when something different comes up or something out of the ordinary occurs? (Worker's ability to apply what he already knows to a new situation.)

☐ 1. Almost never is able to figure out what to do. Needs help on even minor problems.

☐ 2. Often has difficulty handling new situations. Needs help on all but simple problems.

☐ 3. Sometimes knows what to do, sometimes doesn't. Can deal with problems that are not too complex.

☐ 4. Usually able to handle new situations. Needs help on only complex problems.

☐ 5. Practically always figures out what to do himself. Rarely needs help, even on complex problems.

H. How many practical suggestions does he make for doing things in better ways? (Worker's ability to improve work methods.)

☐ 1. Sticks strictly with the routine. Contributes nothing in the way of practical suggestions.

☐ 2. Slow to see new ways to improve methods. Contributes few practical suggestions.

☐ 3. Neither quick nor slow to see new ways to improve methods. Contributes some practical suggestions.

☐ 4. Quick to see new ways to improve methods. Contributes more than his share of practical suggestions.

☐ 5. Extremely alert to see new ways to improve methods. Contributes an unusually large number of practical suggestions.

I. Considering all the factors already rated, and <u>only</u> these factors, how acceptable is his work? (Worker's "all-around" ability to do his job.)

☐ 1. Would be better off without him. Performance usually not acceptable.

☐ 2. Of limited value to the organization. Performance somewhat inferior.

☐ 3. A fairly proficient worker. Performance generally acceptable.

☐ 4. A valuable worker. Performance usually superior.

☐ 5. An unusually competent worker. Performance almost always top notch.

June 1970 S-300R

FACT SHEET

Job Title: Cutting-and-Creasing Pressman (paper goods) 649.782-010

Job Summary: Cuts and creases litho paper stock to form carton blanks using automatic cylinder press. Locks die into position on bed of press. Makes ready cylinder of press by cutting and attaching spot and counter sheet. Sets up and adjusts machine for production according to size of paper stock. Tends machine during operation and performs maintenance by lubricating and making repairs as needed.

Work Performed: Places steel rule die on machine bed, squares die in chase using ruler and locks it into position on press with quoins.

Prepares cylinder of press for operation. Removes old set up by scraping cylinder with putty knife until clean. Obtains carbon outline from imprint of die on cylinder jacket. Cuts out paper counter sheet with sharp knife and pastes in position on cylinder jacket, using glue and shellac, so that it fits exactly with die impression. Smooths paper counter sheet using wood rubbing blocks. Positions paper spot sheet built up with paper tape according to die impressions, between cylinder and steel jacket in alinement with dies. Indents cutting knives of dies with nicker and hammer in several places to hold cut portions to sheet.

Sets speed to feed; size of feed bed; position of guides, straighteners, air blast stripping units; and machine timing, according to sample litho sheet, by using ruler, wrenches and other tools.

Obtains approval of set up and adjustments for production for foreman. Starts and operates machine by pressing starting button and using foot pedals for clutching and jogging. Directs and assists in the following duties during operation of the press: Piles stock and assists fanning and loading of litho sheet stock onto feeder lift. Observes machine stacking of completed sheets for defects in cutting or creasing and for even stacks. Knocks air from between sheets by pounding stack with wood slat. Places board on end of stack of level when needed.

Checks automatic counter and stops machine when specified load is stacked. Inspects litho sheets for proper scoring and cutting after each load. Makes minor repairs to die while on press by changing straight line rule or tightening loose dies. Calls die maker for major repairs.

Lubricates and oils machine following lubrication chart when required. Makes minor repairs to machine, using hand tools. Notifies machine shop of major repairs to be made.

Keeps record of production, as recorded on automatic counter, by posting to chart the number of pieces produced by shift and crew and the amount of waste.

Effectiveness of Norms: Only 66% of the nontest-selected workers used for this study were good workers; if the workers had been test-selected with the S-300R norms, 79% would have been good workers. 34% of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the S-300R norms, only 21% would have been poor workers.

Applicability of S-300R Norms: The aptitude test battery is applicable to jobs which include a majority of job duties described above.

GPO 898.791

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